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Expansion of the Developmental Channels

In March the emphasis was going toward a single developmental sequence concept, and I want to show that there are a number of developmental sequences that have to be taken into account. I will go way back and cover things that I have said before in a more systematic manner.

Before we go into an expansion of the channels, I would like to drive home one concept that is useful in appraising the developmental position of a child. If we look at any biologic process, we will find that its efficacy will graph as an ogive[i] [1] (which looks like one-half of a normal distribution curve) and if we dig into the data behind that graphing, we will find that from the beginning of the first manifestations, to the inflection of the curve, there is not enough of that function to become dominant in a process or to fully express that process. At the other inflection of the curve on into the leveling out, we are seeing that function as being inhibited by some other function that is coming into play or being inhibited because the system expressing that function is reaching saturation. Just as the curve is typical of all biologic processes in an operating organism that is complete, it is also typical of the developmental steps which a child goes through from conception to maturity.

If we accurately measure the expression of whatever was catalyzing a developmental step, we find that the developmental or growth processes are following a series of ogives each of which is getting a little bit longer up to full maturity. Thereafter there will be a low curve and a decline. Even the decline will show some of the curve characteristics. Loss of function with decline after maturity will show some aspects of the function, and while some aspects are being lost, others are being emphasized.

For a moment I will talk about the decline of a person with senility. By the behavior of a senile person who emphasizes certain aspects of his experience, one can tell if his decline is slow or fast. In the past, we have tended to be critical of the senior citizen who sits around home and talks about the golden days of the past but who cannot remember effectively what happened five minutes ago. This has been taken as a sign of deterioration. Now there is evidence from neurological research that the individual who can adequately reminisce or adequately recall learnings of the past is

[1] see endnote for information on ogive graphs

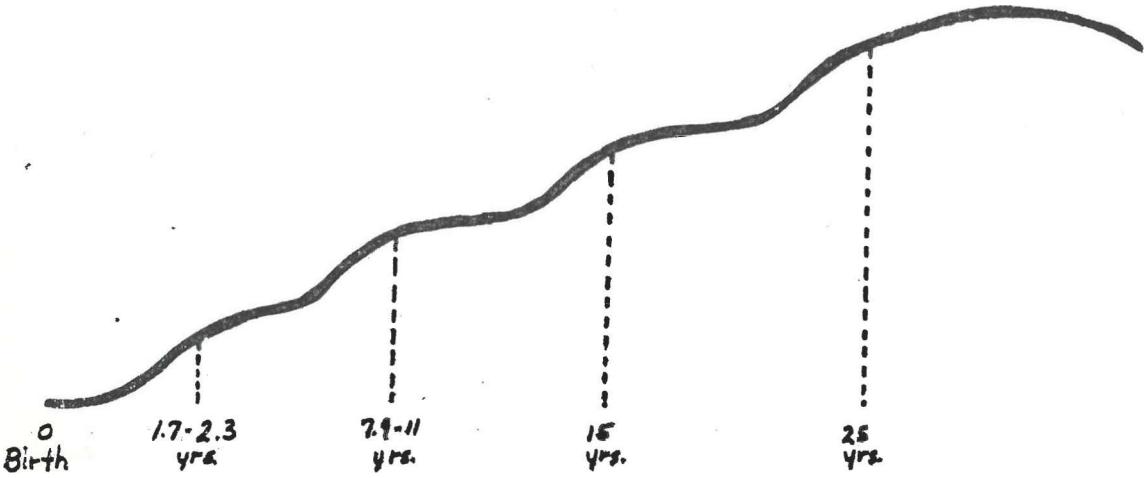
neurologically healthy. The person who cannot have access to long time memory is showing signs of severe neurological deterioration due to aging. Apparent deficiencies in short time memory are probably not in themselves signs of deterioration but are indications that the individual has a tremendous breadth of experiences, and he is recapitulating his past experiences. These individuals have not lost short time memory, but physical activities have slowed down and more time, as it were, and more metabolic function is available for recapitulating past experiences and analyzing factors and concepts of long time memory.

Reminiscing in those who are older is indicative of a healthy operating brain and not a sign of deterioration as was thought in the past. Motor mechanisms and manipulations may have deteriorated but not the nervous system. It is unfortunate that we have developed a social structure that insists on putting you on a shelf at 65 and starts building a shelf at 45. We would have more useful information if a person could be in situations where he could use his past experiences. Recapitulation and analysis of past experiences probably has more validity because of the way the brain operates to look for commonalities in experience. Then some of the expressions on the same topic that the individual made in his earlier days. can be put to use.

So, we find that over at this end of the curve, still an expression of that biologic pattern of the operation of the system, an ogive expression. It is interesting that the ratios involved in describing that segment at the end of the ogive curve are applicable to almost any geometric or mathematical analysis of what a person is doing or has done. For example, the biologic ratio or mathematical ratios that describe that curve are also the same ratios that describe pursuit movements out into space. The particular pattern of movement, on examination of a pursuit movement in three dimensions would be described as a logarithmic spiral. Two dimensional functions in visual movements are segments of that type of spiral. We should not describe saccades, for instance, as just merely straight line movements. Every expression of inspection, the gaining of visual information where the motor system is involved will describe the movement as a logarithmic spiral. The ratios in that spiral are the same as those describing the shape of this ogive: 1:618. It is also the ratio of the effective part of the macula area. It is a derivative of the golden mean, but it is the motion derivative in three dimensions. If I project onto a two dimensional surface the borders within which a pursuit movement was contained, I would be describing a rectangle, whether vertical or horizontal.

The resolution limits or effective stimulus limits of the input as that input would be projected on to a two dimensional plane is the same ratio of proportion as the Greeks

used for design; 1:618, the same ratio as seeds are arranged in a sunflower, or leaves on a tree, or petals on a rose. It is a universal ratio. The performance or structure involved follows the pattern of a logarithmic spiral.



At fifteen years, a comprehensive neurological examination of an optimum developing child will show that somatic or central proliferation of the nervous system has been completed. There is very little you can do to induce further proliferation. Between fifteen and twenty-five, there is still further neural growth in the brain. To say that a late teen-ager does not have all his marbles is generally true because the part of the brain that still has to proliferate is such a small percentage of the total mass, that neurological studies cannot give the exact shape of the curve. All we can see is that the curve is going up to a high point. Five per cent of the total neural structure has not developed at this age. By this we can recognize these types of curves with approximate age upset points where the inflection is quite pronounced in the upper part of the curve.

We can get some developmental clues as to why the curves exist, why certain children have problems and where they are in their particular phase of development. We have to see what is producing these curves. Growth processes, or structural completions, take place as the result of three things:

The first and primary one, largely expressed in the pre-natal period is the electrical imbalance of cells. They are very active electrically and there is a lot of free charge. If the cells are in the proper surrounds of temperature and nutrients, they will grow and divide and create a cell mass, and the nature of the cell mass is determined most likely by the chromosome organization of the cells. So, the first growth process with which we are concerned, the structural completion process, is the electrical imbalance of

cells. The maximum expression of the imbalance is in the intrauterine period, but it continues almost throughout all life, but not at its height. Whenever stress is induced in a system or every time activity takes place in a system, especially a motor system, some of the cellular components of that structure are broken down and as a result, the remaining cellular components have more free charge or free energy than they had in the completed structure, so they draw on the nutrient surrounds, the intercellular fluids, to reconstruct the broken down structure.

Part of the developmental processes, after birth, have moved the system toward a structural completion that is more in keeping with environmental demands that surround that developing individual because the growth processes or electrical imbalances of cells alone would only take those cells of a completed structure to a minimal or general pattern of survival. But the use of structure in a specific environment would first break down cellular components and then the electrical imbalance created by that breakdown will produce a drawing on the intercellular fluids and a restructuring and a further elaboration of the structure that has been influenced by that activity.

So, the restructuring in a system as a result of this particular process has a number of ends which reflect the metabolic function of the individual and the diet of the individual because the structure is drawing on the intercellular fluids that have been provided by the individual's metabolic and dietary processes. One can see a reflection of nutritional status and of the experiential demands put on that individual, because the area being restructured reflects the activity processes that have been demanded by that particular environment. So, the individual at any state will reflect how much activity he has been asked to do, the direction that activity has taken, the systems that have been called on, and also reflect the remaining systems that have not been called on for activity because the remaining system will still be at a minimum survival level.

We are not discounting heredity. That would be true if you were not starting out with certain structural materials gained through heredity. In other words, the structural materials you started with, that are broken down and reconstituted through new structures, provide the foundation for the direction of the capacity of restructuring. So, you cannot say you can completely rebuild the individual, all you can say is that by activity, you are going to redirect the structuring to make him more efficient in the environment in which he finds himself.

A break in a molecule is filled by something from the fluid surround that is electrically compatible with that junction, something that makes it more efficient and more

adapted to the environmental demand. We do not throw out the molecules of structure completely and create new ones. What we do is introduce at certain break points, molecules of substances that are compatible but not necessarily the same molecular substances with which the molecule originally started. A loose analogy is that molecules of hemoglobin and chlorophyll are the same structurally except for one group of atoms at a certain articulation. In theory you can change one to the other. The basic function of those particular molecules is to provide the mechanism of oxygen transport. When iron is present at those particular articulations in that complex molecule, the structuring that is involved, is related to the oxidation of certain carbon molecules. So, it transports active O_2, or is related to the freeing of O_2, and carries the O_2 to an activity center where there is glycogen and oxidizes that glycogen to provide the energy of activity and one of the by-products is CO_2.

But if at that particular junction, you substitute manganese for iron, that molecule is still concerned with oxidation but instead of transport or setting up the machinery of taking O_2 to the precursors that contain the carbon, it is concerned with taking the O_2 away from the center structurally. I am trying to simplify this so my statements may be too broad. So, in the chlorophyll form, CO_2 is broken down when light is not present to free O_2 from the biologic structure, in this case, the plant. Basically, the function, generalized, is the same. It is concerned with O_2 transport, but at this juncture in that complex molecule, iron will have the molecule take O_2 to a point of use, while manganese will take O_2 away from the debris of a point of use to free O_2 back into the atmosphere.

This is not a complete rebuilding of the molecular element of a cell. Depending on what is available in the intercellular fluids, what the activity was, you can get a modification related to the metabolic sate of the individual and related to the area that was brought into activity. The basic function is still there.

The first process of growth, then, is the impetus to grow due to electrical imbalance. The next process of growth or development is the use factor of a system. Growth is not a symmetrical process due to certain neurological hook-ups from one side to another. The first thing that happens is that one part of a bilateral system will grow as the result of the original impetus towards structural completion, the original electrical imbalance gained through heredity. But when that system goes into action due to its state of structural completion, that activity induces activity on the other side through the reflex mechanism, and structural completion on the opposite side is due to the use of the side that is advanced to the greatest extent of growth and is not due to the original impetus.

Due to the fact that there is a series of statokinetic reflexes from one side to another, and due to the mechanics of the body as a bilateral dynamic mechanism, when I begin to use the left arm, the nervous system demands a counterbalance of activity to maintain gravitational stability. The right arm will complete its structure because of the activity of the left arm. Use of the left arm induces the signals of activity through the counterbalancing reflexes of the right side. Use has a great deal to do with the completion of a body or a system. Bilateral reflex mechanisms are such that they induce activity in the least developed or the counterbalancing side at a much greater extent in terms of intensity and area involved than just the immediate structural replacement -patch the amblyopic eye rather than the non-amblyopic eye.

Training activities should be presented to children with not only the immediate manipulatory mechanisms but also with the counterbalancing mechanisms. If I am permitted to use my left arm in a social task, but you ignore the fact that the right arm should be describing the same function with a change of sign to counterbalance this left activity, then I am going to turn into a lopsided individual. The follower antagonist side has not grown as a result of the use of the agonist side to a pattern that is an effective counterbalance, and as a consequence it has to grow to a pattern that gives me an adequate description of the space to which I am responding.

The process of use is one that is largely ignored in the educational processes. There is more concern with the immediate system involved in the activity than with the counterbalancing processes and as a consequence, much of our educational training prescription is damaging to the child rather than providing optimum development. We also have to recognize this: Much of the proprioception that goes up to the higher centers to make for one of the major elements in perception is induced by stretch stimulation and not by contraction stimulation. In much of bilateral activity, the signals that are the basis of perception are the signals of the counterbalancing arm rather than the acting arm. You cannot set up an effective learning process by looking only at the system overtly concerned with the task. Both arms are the system of manual manipulation. There has not been enough taking into account in training procedures or learning procedures that both sides of the organism have to enter in the task, whether it is binocularity, a bimanual task, or whatever you do, especially in manual manipulatory training tasks. The largest indicators of the perceptual pattern come from the proprioception of the counterbalancing mechanism in that system rather than the immediate active mechanism in the system.

I like to speculate this way: I cannot prove what I am going to say, but in the old days there was a lot of speculation as to why the optical projection of the retina was upside down and yet the performance was right side up. If we look at a lot of the counterbalancing mechanisms, they are upside down in relation to the task being performed, in other words, the performance is with a change of sign from the task. Might it not be possible that that is a large part of the mechanism creating the motor side of perception as it relates itself to the retinal projection with which we are concerned, I am not saying that is true, I am just throwing it out for speculation.

Sometimes improper stresses are induced in the counterbalancing mechanism and the projection is distorted. It is possible that there is not enough feed across the system, but the most common thing is improper stresses on the counterbalancing side.

The third area with which we are concerned with growth is the biochemical area. On of the instigators of various phases of growth and various developmental sequences or types of structures is the endocrine system. Because they have a developmental sequence, all the glands are not operating at the same time through the chronological ages of the child. They come into activity in certain sequences, and they instigate certain aspects of structural completion. Accompanying that, because of our structural nature, is our metabolism.

Nature, as an economist, has provided us with an endocrine system that provides the catalyzers of certain growth and functions that are essential to survival. Nature could not trust nutritional intake to provide those catalyzers. Closely related to that is that certain activity that is catalyzed by things in our diet and has a similar function to the products of glandular activity. When we think of the catalyzers leading toward certain types of structural completion, certain types of growth and development, we have to think first of what the outcome of endocrine function in that structural completion is and what has been the effect of the diet on stimulating the completion of certain of the body mechanisms that are related to developmental sequences.

0-2 years: The thyroid is the first of the endocrine systems to come into activity sufficiently to direct or catalyze a growth process. Thyroid activity is a stimulator of certain types of oxidations that are related to tissue breakdown and related to altering the free energy of cells in a manner which completes certain. motor structures. Parathyroid activity has to do largely with the metabolism of calcium and calcium metabolism has to do with laying down of bones and teeth and the efficiency of nerve signals. You would expect very early in the growth process, due to the fact that part of that growth process is the interrelationship of bilateral structures where growth is

induced by activity, you would expect one of the earlier things to be not only concerned with the enhancement of metabolism or enhanced oxidation that makes for the building of tissue, but you would also expect a concomitant action in enhancing nerve signals. So initially the growth processes are being instigated by the thyroid which conies into effective action first.

There is an interesting behavioral concomitant to glandular dominance in the developmental process and that is motivation. The motivation of making some type of relationship with your environment has certain characteristics as a result of the glandular dominance that is producing growth. The motivational factor that is involved during the thyroid dominance is concerned with the observation and manipulation of things. Secondarily, the motivational factor that is involved is a very self-centered one meaning the individual is concerned almost entirely with "How much will this thing satisfy me?" A child in this phase will be very self-centered, asocial, and very much concerned with things rather than people. It is the first stage of kinesthetic-tactile exploration. Each of these phases is protective to the inadequacy of the structures that are going to follow and are being catalyzed by some other pharmacological components. But use of those structures is necessary within their limits of that particular motivation in order to turn the key to bring the next catalyzer of development into activity. An infant at the beginning of this phase has a limited amount of acuity. He can resolve mass but not fine detail. He is limited in certain pursuit movements but has enough to initially satisfy his need for manipulating things by bringing them toward him. At that point, the development of the eye is protecting the subsequent development of the manipulatory structures in terms of fine motor activity. It has the capacity to refine its function. Part of the refinement of visual function through use (consistent with the developmental status of the manipulatory mechanisms) is going to be the triggering mechanism to an adequate developmental outcome of the next endocrine phase. In every developmental phase, we will find part of the system that is involved in total performance at an advanced stage so that during that phase, that particular system or part of a system can, through use, be further developed or refined to provide an adequate readiness for the utilization of the next phase of growth.

In the neurological mechanisms related to vision, there is a potential for further proliferation of those neurological structures, due to the fact that the neurological activity with the accompanying activity (training) can increase the density and quantity of the template mechanisms, (the nuclear proteins, the DNA and RNA). This is true if those mechanisms are put to use as far as vision is concerned, during these developmental phases, in a manner consistent with the developmental state of the

manipulatory mechanisms and orientation mechanisms that accompany them. In the first phase, if we now begin to introduce form experience, the basic survival function of his resolution, through developmental experience, we can proliferate the neural structures related to vision that have to do with form perception. Form experience, starting in this period, due to the motivation of the child, and due to the readiness of the visual mechanisms to refine their function through experience, can proliferate that part of the higher nervous structures that are related to form identification, form use, the acquisition of meaning through form, because at that particular phase, DNA-RNA concentration, that is the template of nerve structure, can be increased due to the use of form. So, we have to be concerned with the motivation of the child, his manipulation of things, and provide the experience related to the form of things to lay down the nervous structures to make for the ultimate use of form in a symbolic sense and the communication within our structure.

What do we look at in the child in that age range? Is his visual alignment improving through use, is his resolution improving through use, is manipulation and identification of form improving through use, is he developing a choice in the forms that he will accept or reject? Move in on him experientially by presenting him with a multiplicity of form experience in his immediate surrounds. Not two dimensional form experience because the mechanism of enhancing neurological proliferation related to vision is concerned largely with three dimensional experiences. Later the child can abstract out of the three dimensional form part of what becomes two dimensionally operative as far as identification is concerned. We are dealing with the critical point in vision during this developmental stage and we have to take into account the pharmacological mechanism of motivation in that phase. Diagnostic clues as to where he is and where he is headed can be obtained from his behavior. We can also prescribe the necessary experience to enhance his development or take away experiential demands that are inconsistent with his readiness to perform in the direction in which he should go. Accompanying this phase are two things essential to vision: (1) Modification of the survival aptitudes or capacities of vision in the direction of refinement which takes place only through experience, and (2) the beginning of the enhancement of the biochemical structures that make for nerve proliferation through use as that nerve proliferation is related to the use of form.

If a diagonal pattern had been used in the visual cliff, a visual limitation would have interfered with the identification of the surrounds as far as the cliff is concerned. Acuity for a diagonal is 25% less in the developing child up to the beginning of pubescence in the first two spans than it is for the vertical and horizontals. A diagonal line is an interpretive process. Ocular transport on a diagonal is related to a pattern of

motor manipulation. Motor wise, both the mechanism of input and the mechanism of output have not reached the maturity where diagonals can be effectively manipulated, so we have an acuity protective mechanism. This is one of the reasons why a child can draw a rectangle but blows up trying to draw a triangle.

The diagonal function which emerges after the vertical and horizontal functions is the resultant of much circular or spiral activity in reaching for space and pulling it back, either the reach of the input mechanism or the reach of the output mechanism. Diagonals are structured as tangents of the spiral or circular function. If a child has passed the phase where he should effectively use diagonals and he cannot do so, then we should look at his diagonal performance, find the lags, and introduce activities that will first enhance the curvature of his movements into space and then begin to take the segments of that curve and express them in terms of form.

Physical signs of deficiencies in thyroid or parathyroid activity:

1. A lethargic child, one who is beginning to show a fatty development patterned around the hips.
2. A child, who when presented with a three dimensional form in his near space, does not begin to reach for it. He is not building enough fire to utilize his dietary intake or to be fully active.

Ocular signs:

1. Staring into far space.
2. Dodging or resisting the object that is presented centrally.
3. Gross hunt for things.
4. Acting as if there was binocular amblyopia.

Improper experience is not satisfying bilateral needs and the child lays the foundation for later amblyopia or squint, both of which are expressions of rejecting the stimulus center, behavior-wise. This applies to the period from two hours after birth to approximately four years.

Disinterest and lethargy are indicative of a deficient thyroid function. With a parathyroid deficiency a child may begin an overreaction and then stop before the action is completed and he is liable to be labelled a spastic. Other signs are needed to do a differential observation.

Another of these signs is pica[ii]. The child may eat dirt, mudpies, plaster, clay, or lead paint. Most physicians do not recognize the subclinical manifestations. Instead, they

say he will outgrow it. Curative medicine is much more spectacular than preventive medicine. The child is expressing a request for calcium by eating mudpies, and the beginning of a neurological insufficiency.

Thresholds of the taste buds change with the biochemical needs of the child. If left alone, the child would only eat those things his body needs at the time. Cultural demands such as "Eat your spinach" are ruining nature's method of seeing that the child gets an adequate diet. For our convenience we ruin the mechanism that nature has provided.

Ages two through eight: The growth processes are being catalyzed by the effective development of the pituitary gland, the so-called master gland. The pituitary gland is still related to self-centeredness, to the enhancement of oxidation and to achieving those things through stimulating the completion of other glandular structures. It is also related to the enhancement of water metabolism, better control of body temperature and the development of the interstitial glands.

The child is still a selfish child, developmentally extending his working space, still interested in things but also in what he can achieve by manipulating moving objects, concerned with the manipulation of people but on a self-centered basis. "How much can I get away with?" Visually the individual who shows a very deficient motion field is showing that he has not moved into this phase.

Expression of enuresis, wetting the pants, shows that he has not gone far into this field of water metabolism along with sphincter control. The child who is not trying to show how much he can get away with has not moved into this phase. He watches people but does not go over and kick them in the shins. The manipulation of objects has moved him from feel and taste to, "How much can I make them move?" He throws his blocks now rather than eating them. The ultimate process of survival, meeting needs and satisfying needs, both of which are derived through controlled action, is beginning to show up in his development. How much is he attracted by something outside of his reach, how actively is he trying to move towards something that is outside of his reach, how much bilateral manipulation is there, how much does he relate verticality to positioning himself for manipulation, how much eye-hand, eye-foot coordination is he beginning to express?

The last pattern of action is slowing down and leveling out due to the fact that the next one is coming into play. If there is any block at that point, he will tend to vary between the two functions, regressing into the previous one but also expressing the

next one. He will go across the room to pick up a block but not throw it. He shows a limited amount of motion. His exploration is static rather than dynamic.

The "human terror" is saying that now you can organize experience for him, if you let him stay in that "terror" phase and don't direct his experiences, he will stay in the phase. At this time, you have to be concerned with something that is related to the enhancement of neural function and to the proliferation of nerve structures that were induced by previous form experiences. From age six to seven-six, the controlling mechanisms of sustained action in the brain and especially in relation to visual experience are beginning to stabilize. Previously one of the protective mechanisms expressed in the brain against too long participation in the same activity is related to a brain wave, self-generated, that cancels out most of the signals that have come in that are related to the thing he has just been doing. This prevents him from maintaining a sustained activity longer than the capacity of the system to sustain it. It does not permit a system to go into fatigue. It does not permit a system to sustain an activity to the point where only one of its functions is development. This is the delta rhythm.

Up to the age of seven to seven-three, it still will cancel out a major part of a child's interest in a task. You can spot it because the child will begin squirming, try to talk you out of it, change the subject either by oral expressions or by altering the center of interest posture-wise. Yawning is an expression of a protective mechanism. Forcing the child to continue a performance can sustain the expression of the delta rhythm and will in later developmental periods be expressed in temper tantrums.

In training activities, you have to change the apparent demand or organization while still getting at the same system. If you want a child to walk a rail, keep changing the target so the reason for his walking not have to be performed more than two to five minutes in relation to any particular target. He needs a lot of motivation, change of activity, because if you don't do it, you are training in the delta rhythm which should extinguish itself except in extreme emergencies at about seven to seven and one-half. A temper tantrum is only one expression of it. It can be a complete withdrawal.

The extension of myelination is going on all the time. Bluish cast overlay is indicative of sustained interest. Biochemically the child is organizing to get out of the situation; learning to avoid rather than learning to do it. The only reason he is doing it is because it is a compulsion.

At age six to seven-six the delta rhythm tends to extinguish. Previously it had been protective; it cancelled out the major part of input demand to perform for the purpose of not overworking the system. Later in the child's life the only time it comes into action is under intense or sustained shock. Amnesia after a severe accident - the delta rhythm has wiped out the use of the circuit that was involved in that activity. It is protective in that case; it would kill the person if awareness was involved. At death, the delta rhythm comes back and is quite persistent. The people being hurt by a death are the observers and not the dying person. It has cancelled the hurt response. This does not occur in cases of strangulation or drowning.

In this period of just before six to just after seven, you have to be careful about sustained demands because the outcome of a sustained demand would be to condition in delta and lead to tantrums and withdrawal. A withdrawal visually delimits his effective environment. A protest throws the near environment away and moves clear out into space. One would be a myope and one would be a hyperope. A child of six to seven doing a sustained task is changing the subject himself and should not be interrupted by an adult. He is motivated by several kinds of information. He will sustain an act if it has enough different kinds of information and emerging motivations. Doing the same thing over and over is bad and leads to the over stimulation of the avoidance mechanism but if the task has a sufficient complexity within his capacity, it will hold his interest. The drill demand through time is creating an avoidance and a habituation, reducing the efficacy of his skills.

With the development of the pituitary gland, the first function is growth catalyzation, another approach to oxidation - promoting that growth, but it is also an approach that brings other mechanisms into function that are supporting mechanisms of that growth process. The pituitary has a number of functions. Its initial one is to carry on some of the types of growth activities through oxidation, that have been started by the thyroid and in the process of carrying that on, it is also concerned with triggering the maturation of other mechanisms, such as stabilization of water metabolism, stabilization of the thermal response mechanisms, the development of the interstitial glands, and then the integration of the functions of the glandular systems. Our immediate concern here is the change of the nature of behavior from that of manipulating objects statically to that of beginning to manipulate things in motion, still self-centered: "What does this mean to me?" but in relation to people which is part of the motion environment of that particular child. This also implies "How much can I get away with?"

At about eight, another glandular system enters in, triggered by the pituitary development, but it begins to change the behavioral motivation and that is the gonadal system or the interstitial glands which must be differentiated from the immediate sex function of those glands because they are also concerned with the total well-being of the organism and its motivation. We have been prone in the past to not think of interstitial function until the emergence of visible secondary sex characteristics. And that probably is a mistake in supervising the development of a child. We should move back to about eight or a little before where we have the emergence of the endocrine function of the interstitial glands and the attitudinal change begins to emerge. The attitudinal change is very interesting because it is the beginning of socialization and is built on "How much can I get away with in the manipulation of people?" But it is still people centered. It is, more or less, "Where do I fit into the scheme of things?" "What can I do for them?" rather than "What can they do for me?" You can see that ultimately this becomes a sex related function."

You should be able to see that shift of behavior at about eight. So, if we do not introduce socialization concepts at that time, we are probably building the development in the direction of asocial outcomes even to the point of being antisocial. Training-wise or education-wise, at that particular time we should take a look to see if the child begins to take an interest in what the others are doing in terms of how he can participate. If he still shows the tendency to use people and objects, then we know there is some type of slippage in his developmental rate, and we better get busy on him. That is a good point where we can use experience to overcome the developmental lag that may be showing up. Set up training procedures where more than one are participating; training procedures where the operation has to be cooperative, either between doctor and patient or between two patients. Set up procedures where each patient can see the advantage to him of working with the other person. See that they cannot attain what they are driving at without collaboration. At eight or a little after, group training has a double advantage: laying the foundation for socialization which can in turn overcome some of the lags of interstitial emergence in the final framing of the activity of the master gland system of the conversion of the motivational aspects of pituitary function and the integration of all of the endocrine functions.

At this age also because of neurological maturity, the child begins to show a capacity to sustain activities, especially visually centered activities because after seven-six, the alpha rhythm begins to stabilize. It is probably concerned with relating experiences in other modes that have been thought of as independent experiences to the visual input and the significance of vision as the major communicative function. The beginning of

socialization, convergence of action manipulation into social collaboration and the stabilization of alpha, all add up to seriously beginning to sustain visually centered tasks, relating input to output in your experimental design, and relating other modes of experience to that much-needed organization of visual input. This is the place where we are looking at Piaget, where sensory motor experiences now are contributing to assimilation. The child is now relating what had been sensory motor experiences previously in independent modes to the organization of vision and he is now seriously coming to you with integrative possibilities of moving through concrete experience into symbolized experience.

Beyond this you will have to pay attention to input skills, matching patterns of output with input, experiences that have a symbolic connotation, the semantics of experience, what symbols stand for, and certain aspects of concrete experience. This is the place where the developing organism is ready to substitute labels meaningfully for the immediate independent and concrete experience with objects, with motion, with all of the things implied by the two original motivations.

How do you know if there is pituitary lag? (1) Fatty deposits around the chest, (2) erratic expressions of temperature, (3) feverish under stress, (4) diurnal cycle: temperature change of one to one and one half degrees is expressing lag in this development.

Body contour, attitude towards other kids, attitude toward representations: all of those should be in your observation on whether this child is moving through this developmental phase. At the end of this phase and into the next curve, which is more or less the developmental curve of the integration of these motivation systems, you will find the occupational exploratory stage which has to be handled with a great deal of care. He wants to be a policeman today and the next day an astronaut and the next day a pilot, ranging over all gamut of occupational expressions, especially in relation to other people and to the utilization of forms to satisfy an integrative need of all of these previous motivations in terms of social utilization. This is the place to begin directing his attention to exploring what people do, pay attention to expressed capacities and begin to use your motivations and training experience along the expressed capacities. This is the place also where you will have to be very careful to make certain that you are communicating with the child and asking the child to perform using his own methods of perceiving. You can, by failing to recognize his methods of perceiving, make him a discard when he should not be.

What I am getting at is this: Due to neurological maturation at this point, and the desire to explore, if we present everything to him in a training procedure in terms of his taking in visual input and mentally manipulating it, we are not reaching the group whose visual inputs are treated factually rather than creatively. Therefore, we are getting what seems to be a reduced response, a failure to comprehend. If we demand motor manipulation entirely, we are not reaching with the inputs the person who can look at an event or an object or a relationship and extend it in his imagination into other situations, other times, and additional conclusions.

So, the eight year old and beyond is moving into interstitial dominance in his maturation. This individual has to be studied carefully as to what he will do with his visual input. Is he going to interpret it, extend it through time, relate it to other symbols in terms of a visualization, will he relate it to kinesthetic-auditory-tactile creativity? At that particular time, we have to be careful to use every procedure of evaluation of his neurological organization in terms of imagination and creativity. Both groups are using visual inputs and need refinements of their visual skills. One group has to be motivated in terms of visualizations or creativity, the other group in terms of action.

Those are some of the things that must be taken into account during the interstitial phase and the following integration phase. From eight to fifteen is the beginning of socialization. From eleven to fifteen are the expressions of exploring, "What am I going to do?" "Where can I find the best expression of my interests and talent?" Parents become intolerant of kids' attempts to find themselves, jumping from one interest to another.

In the training room the child will want to know all about a particular piece of equipment but when you set up a training procedure, he will become avoidant to it unless you relate that procedure to another one and to the expected outcome. You cannot piecemeal training procedures; you must give them some daily take-home pay and they have to know what this is for and how it works.

Interview parents and find out what the kid is asking for and what the parent's attitude is toward it. Have they given him something new every day or have they pressured him into mastering one thing? Either one would be disruptive to his development. Has someone shown him that some of the interests can be satisfied by community facilities like libraries, museums, and others only by ownership? Exploration is a healthy expression of the development of the individual and it must be used in a constructive manner. It must not be destroyed by an inhibition or abused

by giving him too many things, nor must we, in an instructional situation, piecemeal the instruction so that each step is an independent event, as far as the child is concerned.

In the initial performance the kid may look like he will be a whiz, but he might just be expressing this exploratory interest. We also, in developmental or educational experience that we organize for kids in this program, have to let the kid have some part in the design of the procedure, otherwise we are expressing an experience of organization back in one of the previous motivational spans; we are expressing self-centeredness. You will have a great deal of difficulty if you do the entire design and then put the kid in the procedure and say, "Do this or else." He is showing a readiness to launch out on his own and we can do a lot of harm by blocking that, just like we can do a lot of harm by providing him with too many things, rather than directing that expression of exploration into economically feasible and experientially desirable channels.

From eight to eleven, the principal motivation is "Where do I fit into the scheme of things?" in other: words "How can I achieve my goals by cooperation?" From eleven to fifteen, the motivation is expressed by "Where do I fit into the scheme of things occupationally?" This does not reflect the beginning of a job but exploring to see how he can satisfy a predominant and lasting interest. You will have to motivate by the different expressions of aptitude and set up procedures related to those aptitude expressions. The skillful educator and the visual trainer can achieve his ends and still structure what he is driving at around the interests or aptitudes of the child.

In the two phases of this span, there is considerable recapitulation and integration of previous experience and motivations. In the beginning is the motivation of manipulating people to a joint relationship among people to achieve an end, cooperation substituting for self-centeredness. Be careful in that particular phase that our motivations, our discussions with the child do not destroy some of the self-centeredness because if it does, if we over socialize, we are forever destroying the individual's competency, because the competent individual is the one who has learned that he has to give in order to receive and he has to maintain an intelligent selfishness in order to succeed. There is no such thing in a competent individual as a complete dedication to society and to other fellows. The intelligent selfishness that I am discussing is one where we reach the height of cooperation in order to also satisfy our own needs by helping others to satisfy their needs, too. And so, during that first phase where they begin to overexpress their interest in others, we must retain some what the two-way interchange or the selfish aspect of the original motivations.

During the latter phase, we are getting a recapitulation in a social direction of the manipulation of things. In other words, a recapitulation moving in the opposite direction of the original direction of motivation. And there we have to make it possible for them to explore in a short span of time symbolization and interrelations, both personal and occupational, with much more depth and breadth. So, we must not destroy self-centeredness; we must redirect self-centeredness into an understanding and co-operation that the person's needs ate best satisfied by co-operating and satisfying someone else's needs.

The biggest destroyer of society is the social worker who insists that all cooperation be on a one-way street from the individual towards the group with no return to the individual. And I think that the foundation of that interpersonal collaboration and the recapitulation of the use of things to satisfy an occupational or aptitudinal interest has its strongest building or foundation in those activities that are concerned with the major mechanism of symbolization, the major mechanism of acquiring information and synthesizing it, the major mechanism of deriving universals from various experiences, and that is the visual mechanism, the mechanism of attaining meaning through vision.

After the age of fifteen, we cannot do much about the further direction or proliferation of structures and their integration. So, from about fifteen to twenty-five, our principal motivation is the horizontal elaboration of experience rather than the vertical elaboration of experience. It would be difficult to demand a brand new skill that has not been explored before, to build into a new system, a new relationship. We cannot ask him to develop a new skill, but we can show him more applications of a skill that he already has, to enrich his own skills.

At this time in development, after fifteen, there are many of the potentials for developmental changes that have become very restricted. For example, if you do not get after development of form perception through many types of form experience in the span from 1.5 to 2 to 9 through 11, you cannot create the potential for more DNA-RNA, and as a consequence, more proliferation of nerve structures. The potential is lost or has gotten to a state where you would have to devote all the time over a long span of time, trying to work on this particular developmental capacity. That does not mean that with the form skills that have already been acquired, you cannot lead the individual to further applications of those particular form skills.

In many of the developmental possibilities, when they move on into this age span, you are running into a very difficult situation in trying to change an organic method of expression to the point that the individual and social economics are such that you had better start structuring a substitute behavior rather than try to restore to its full capacity the original potential. You have very little developmental potential in any of the systems of further elaborating that particular structure or inducing further neural connections. After fifteen, the somatic potentials of having function alter structure are very small because structure has reached too many closures. To produce a structural modification requires an intensity of experience and a time of experience that is very uneconomical both to the individual and to the group. So, we have to figure out how the same end can be achieved by the utilization of some combination of other mechanisms. You might by enhancing the tail end of occupational motivation, be able to get the individual to supply the intensity.

At zero age, all potentials are open. As growth continues, electrical imbalances become satisfied, and structure is closing up and as a consequence potential is being reduced. Later you have to work with acquired skills and not the structuring of new outlets. The neurological potential from fifteen to twenty-five is largely the potential of the integration of experience and derivation of a higher level of symbolization but not the alteration of structures through function by which the initial experiences can be attained. The individual from fifteen to twenty-five is concerned with the derivation of more universals, the development of a higher level of use of symbols, perpetuation, and elaboration of skills in relation to symbols, or maintaining the dynamics of skills already acquired. Training procedures, especially as they approach the limit of that developmental span, should be directed at the preservation of the dynamics of skills, because utilization in occupational channels will tend to enhance one skill at the expense of all others. Training procedures should be directed at the preservation of the other skills.

A biochemical illustration: The highest level of efficiency in any one of the major developmental channels, but especially those channels that are chemically or electrically maintained at a very delicate equilibrium, a balance between the segmental functions that go to make up that total function, the organism is constantly trying to move toward a steady state, so if there is a combination of skills or expressions that makes for optimum dynamics, and one is emphasized to the exclusion of the others, the organism will tend to seek a balance at a lower, more stable level. One of the metabolic factors that must be maintained is the balance of the intakes related to oxidation, and have at least four constituents, and that oxidation function is best maintained at a delicate equilibrium between those four which are

vitamins B1, B2, niacin, and the B complex. If we overemphasize the use of one, or do not take in enough of one in our diet, the organism will first go into hunt, trying to supply that need at this very high level of chemical and electrical equilibrium and will express a lot of pathology, behaviorally and physiologically in going into hunt to satisfy that need. If the need is not satisfied over a certain time, the organism will reject part of the normal balance to bring the normal intakes down to the level of the deficient one. That interrelationship of dynamic equilibrium operates in almost every area where more than one mechanism is implied in a skill or a behavior, that if only one part of it is emphasized to the exclusion of other components, the organism will go into an erratic behavior first and then if the need is not satisfied, it will reject those that are creating the imbalance in order to balance those various segments of a total function with the one that is functionally at the lowest level. In this situation you have an electro-chemical imbalance that is very hard to break because of its stability.

If niacin is deficient initially in the B complex, the individual will show up with symptomatology, looking for a balance, which result in lesions of the mouth and lesions in vision, especially that part of vision that is connected with the analysis of an input and the determination or the satisfaction of a set at the time of that input. But that erratic behavior does not last long. If, in the hunt, the niacin cannot be found, the signs will disappear, but the individual will perform at a much lower level than his initial potential.

In the economically depressed areas, where diets are inadequate there are large groups who are expressing a low IQ on an intelligence test and we tend to reject them because we say that for genetic or other reasons, this group is not developmentally adequate or potentially adequate for social participation. If their niacin balance is restored, IQ's go up 20-30 points. Their survival efforts will reorganize a disturbed system at a lower, more stable, a less dynamic function, to survive. It takes about six months for the IQ changes to occur.

Let's move onto another aspect of the catalyzation of behavior. In the long period of evolution, the evolution of nature has built into the organism the endocrine mechanisms, for example, that are concerned with the catalyzation of growth and behavior in terms of the pharmacological or biochemical mechanisms that cannot be satisfied in most of the environment through dietary intake. Nature has not built into the organism mechanisms of production of daily catalyzers needed for activity that can be obtained through diet. Some of the catalyzers of growth, catalyzers of activity which we are concerned with are vitamins. We should be more concerned with them

because some of them have a direct bearing on visual efficiency and show signs of their deficiency.

You know, for instance, that the successful operation of the receptors in the retina is dependent on the precursors that are represented by sources of vitamin A, the same vitamin that is the catalyzer of surface or skin integrity. In the case of the retinal use of it, it acts as an enzyme that releases its energy when its energy system is closed by the energy of some outside source. In the case of the retinal structure, the outside source is light and its free energy that is released by that closure functioning as an enzyme is the energy that triggers the receptors. So, closures can take place in many ways. Excessive light can produce a closure of that enzyme structure so it can no longer function efficiently. Inadequate diets can also produce a closure due to stabilization at a lower level that affects the visual receptors. Also, diets that are taking in the wrong form of the precursor of vitamin A due to some dietary fad can produce an energy closure, an insufficient supply of free energy to trigger the receptors.

But because vitamin A is also related to epithelial integrity, the visible epithelium will tell you that this individual is deficient in vitamin A and what he tells you will correlate with certain things he says about his vision. He will tell you that he has a terrible time trying to resolve something that is "out there!" and that he can resolve things "up here" but that he cannot sustain the resolution. He will tell you he is photophobic, he will need filters, that his eyes feel dry and scratchy. That is the general symptomatology. A look at the anterior eye will show expressions of the deficiency of vitamin A. The conjunctiva on the lids will appear to be striated. The lids will stick together early in the morning; the sclera looks white and chalky. You can barely see the surface circulation in the sclera. At certain angles you can see a transparent thickening of the sclera to the point of pterygia in some individuals. He complains that he cannot maintain accommodation. He is expressing an unstable myopia or a progressive myopia. Yet the posturing mechanisms of the eye are functioning normally. The accommodative mechanisms are malfunctioning. You can safely say that this visual disability is due to the fact that the individual is off balance in vitamin A. He needs visual and nutritional aids.

You can see this expression quite frequently in the individual who drives a tractor who is always looking straight ahead and getting a lot of blue sky or overcast sky exposure. Sometimes the clinician is prone to blame his visual disabilities on ultraviolet cataracts emerging when actually it is a fact that the energy of the blue band in the sky is closing the enzyme that is transporting vitamin A to the receptors in the eye. So, we are having a metabolic function interfering with vision and producing a

myopic expression, but not a stable myopia. In fact, in the early part of the summer the myopia will be considerably reduced. In the middle of the winter, it will be very high which gives us a clue. In the early part of the summer when there are fresh green things available in the diet, the individual is treating his deficiency. So, there are ocular signs.

Suppose the individual comes to you with photophobia, excessive lacrimation, blue sclera, a very thin sclera, proliferation of circulation in certain areas of the cornea, and says that he cannot do anything "There", but he can get fairly good resolution at far, but he cannot maintain it. The chances are good that that individual is suffering from a deficiency in the B complex, particularly B2 or riboflavin. As a consequence, there is not adequate catalysis of the ocular mechanism and associated mechanisms related to oxygen transport. He, too, will have a fluctuation of his visual disabilities, a seasonal fluctuation depending on the diet, more severe in spring or summer than in mid-winter because his needs are satisfied with his meat intake. In this particular instance, he may have adequate diet and still show the same symptoms. If you take a look at him, he may not have adequate molar dentition. His grinding teeth are not working. The extraction of the component that makes for visual efficiency from his type of dietary depends on adequate grinding operations, especially with meats, and especially with lean pork. If he cannot chew, grind, and extract, then he will have a deficiency and it will be expressed as a visual disability. There is not adequate catalyzation of the oxygen transport mechanism that makes for efficient resolution function, and you can see it in the above mentioned ocular signs and in the corners of his lips that look like cold sores.

No amount of immediate attack on the ocular mechanisms in terms of transport or optical function will solve that problem. A big contribution can be made because in his case and in the case of the first type, too, the chances are better than even that they are in a situation where they are being exposed to too much actinic[2] radiation or ultraviolet and blue. You can even see a physical type that will express this deficiency more often than will another type. The individual who does not have prominent brows or orbital forehead structures will more often express a deficiency in one or both of these components due to light exposure than somebody who has a built-in overhang in their visual structure to protect them from the sky.

[2] relating to or denoting light able to cause photochemical reactions, as in photography, through having a significant short wavelength or ultraviolet component. Oxford Dictionary online

Occupationally you get another expression: Do they, in their occupation, stare ahead or downward? You can train them to get relief by looking downward. There is no need for a tractor driver to constantly be looking straight ahead when he could just as well look where he is going to plow next and get some protection from that blue component in light.

You can also get into modifying interior environments. Draftsmen often put the drawing board against a north window, so the shadow of the pencil is toward them and not interfering with their visualization of where a line is being drawn. You can show them that by using adequate shadow free light they can get a better visualization of drawing and get an improvement of their visual disability because now they are no longer being exposed to the sky. So there are some occupational traits that are more liable to be basic to the etiology of that difficulty than the straight dietary deficiencies. Those things should be in your training armamentarium, especially for the adults who come in with these symptomatic expressions.

If I was in your position and a child was brought to me expressing a very erratic myopia, and was showing photophobia and a thin sclera, my first question would be, "Do you eat a lot of candy?" and if so, while you are undergoing this visual training, you will have to leave the candy alone. The balance of vitamin B complex to carbohydrates is relative. The kid who eats a lot of candy creates a relative deficiency in that complex and is winding up with a visual disability.

You have to be able to recognize what is creating that nutritional malfunction. Is it the diet or is it the visual environment and it can be the dentition of the individual. Some of the nutritional intake that is related to vision is related to the grinding operations of teeth. At least you ought to be sensitized to observe the potential of a dental problem. It might be related to either the inability to get all the training results you would like to get or to the dietary deficiencies that are creating the visual problem. You ought to be able to recognize a malocclusion. This can be done in a number of ways: The individual with one side of the face looking older than the other side is not chewing adequately. Chewing is a reciprocal operation bilaterally. If he chews too much on one side, he must do it because he has a lateral malocclusion, and his nutrition will be interfered with. If he has absence of molars, his cheeks look sunken. In a young woman, especially, you will see very fine wrinkles down the side of the cheeks, showing that her molar structures are deficient.

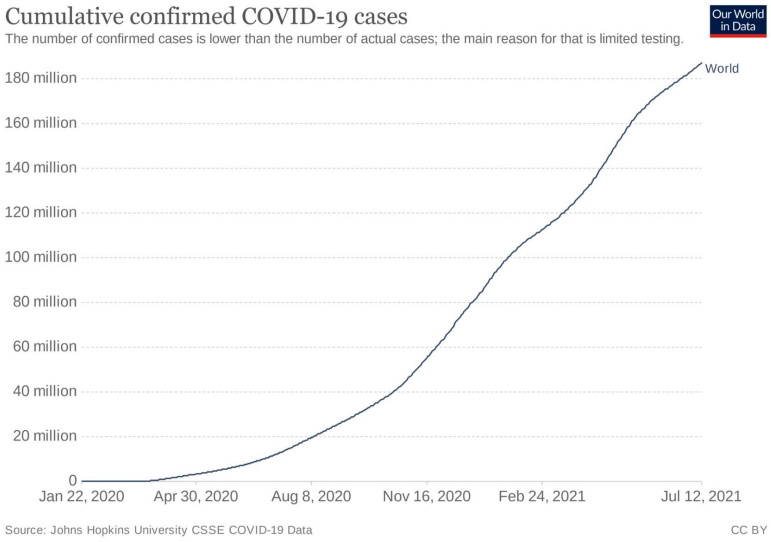
Another thing in the dental relationship is that unbalanced chewing processes due to malocclusion can create anisometropia because as they do their chewing more on one

side, they tend to try to stabilize the bilaterality by turning their heads and pulling one condyle more centrally than the other. You can almost describe a syndrome: a malocclusion, an anisometropic tendency, and an anterior eye symptomatology like I described earlier with the inability to maintain accommodation or the ability to accommodate at only a certain distance out into space. You should learn some of the observation techniques that permit a differential diagnosis.

Endnotes

[i] **Ogive** - a cumulative frequency graph or cumulative frequency polygon

Example of an ogive graph showing cumulative cases over time.



https://en.wikipedia.org/wiki/Ogive_(statistics)

[ii] **Pica** - Pica is an eating disorder in which a person eats things not usually considered food. Young kids often put non-food items (like grass or toys) in their mouths because they're curious about the world around them.